



Guideline for the Management of Patients With Valvular Heart Disease

Aortic Stenosis

Derived From:

Otto CM, Nishimura RA, Bonow RO, Carabello BA, Erwin JP, Gentile F, Jneid H, Krieger EV, Mack M, McLeod C, O'Gara PT, Rigolin VH, Sundt TM, Thompson A, Toly C. 2020 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;143:e1-e156. doi: 10.1161/CIR.0000000000000923.

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American College of Cardiology
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The American Heart Association
professional.heart.org

Full-text guidelines available in both *Circulation and JACC.*

Note: the numbering of tables and figures in this pocket guide differs from that of the Clinical Practice Guideline.

Table 1. Stages of Progression of VHD

Stage	Definition	Description
A	At risk	Patients with risk factors for development of VHD
B	Progressive	Patients with progressive VHD (mild-to-moderate severity and asymptomatic)
C	Asymptomatic severe	Asymptomatic patients who meet the criteria for severe VHD: C1: Asymptomatic patients with severe VHD in whom the left or right ventricle remains compensated C2: Asymptomatic patients with severe VHD, with decompensation of the left or right ventricle
D	Symptomatic severe	Patients who have developed symptoms as a result of VHD

Table 2. Frequency of Echocardiograms in Asymptomatic Patients With VHD and Normal Left Ventricular (LV) Function

	Valve Lesion			
Stage	**AS***	**AR**	**MS**	**MR**
Progressive (stage B)	Every 3–5 y (mild severity; V_{max} 2.0–2.9 m/s)	Every 3–5 y (mild severity)	Every 3–5 y (mitral valve area [MVA] >1.5 cm^2)	Every 3–5 y (mild severity)
	Every 1–2 y (moderate severity; V_{max} 3.0–3.9 m/s)	Every 1–2 y (moderate severity)		Every 1–2 y (moderate severity)
Severe asymptomatic (stage C1)	Every 6–12 mo (V_{max} ≥4 m/s)	Every 6–12 mo	Every 1–2 y (MVA 1.0–1.5 cm^2)	Every 6–12 mo
		Dilating LV: more frequently	Every year (MVA <1.0 cm^2)	Dilating LV: more frequently

Patients with mixed valve disease may require serial evaluations at intervals earlier than recommended for single-valve lesions. These intervals apply to most patients with each valve lesion and do not take into consideration the etiology of the valve disease.

* With normal stroke volume.

Table 3. Risk Assessment for Surgical Valve Procedures

Criteria	Low-Risk SAVR (Must Meet ALL Criteria in This Column)	Low-Risk Surgical Mitral Valve Repair for Primary MR (Must Meet ALL Criteria in This Column)	High Surgical Risk (Any 1 Criterion in This Column)	Prohibitive Surgical Risk (Any 1 Criterion in This Column)
STS-predicted risk of death*	<3% AND	<1% AND	>8% OR	Predicted risk of death or major morbidity (all-cause) >50% at 1 y OR
Frailty†	None AND	None AND	≥2 Indices (moderate to severe) OR	≥2 Indices (moderate to severe) OR
Cardiac or other major organ system compromise not to be improved postoperatively‡	None AND	None AND	1 to 2 Organ systems OR	≥3 Organ systems OR
Procedure-specific impediment§	None	None	Possible procedure-specific impediment	Severe procedure-specific impediment

* Use of the STS Predicted Risk of Mortality (http://riskcalc.sts.org/stswebriskcalc/#/) to predict risk in a given institution with reasonable reliability is appropriate only if institutional outcomes are within 1 standard deviation of the STS average observed/expected mortality ratio for the procedure in question. The EUROSCORE II risk calculator may also be considered for use and is available at http://www.euroscore.org/calc.html.

† Seven frailty indices: Katz Activities of Daily Living (independence in feeding, bathing, dressing, transferring, toileting, and urinary continence) plus independence in ambulation (no walking aid or assistance required, or completion of a 5-m walk in <6 s). Other scoring systems can be applied to calculate no, mild, or moderate to severe frailty.

‡ Examples of major organ system compromise include cardiac dysfunction (severe LV systolic or diastolic dysfunction or RV dysfunction, fixed pulmonary hypertension); kidney dysfunction (chronic kidney disease, stage 3 or worse); pulmonary dysfunction (FEV1 <50% or D_{LCO_2} <50% of predicted); central nervous system dysfunction (dementia, Alzheimer's disease, Parkinson's disease, cerebrovascular accident with persistent physical limitation); gastrointestinal dysfunction (Crohn's disease, ulcerative colitis, nutritional impairment, or serum albumin <3.0); cancer (active malignancy); and liver dysfunction (any history of cirrhosis, variceal bleeding, or elevated INR in the absence of VKA therapy).

§ Examples of procedure-specific impediments include presence of tracheostomy, heavily calcified (porcelain) ascending aorta, chest malformation, arterial coronary graft adherent to posterior chest wall, and radiation damage.

Table 4. Stages of AS

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	• Bicuspid aortic valve (or other congenital valve anomaly) • Aortic valve sclerosis	Aortic V_{max} <2 m/s with normal leaflet motion	None	None
B	Progressive AS	• Mild to moderate leaflet calcification/fibrosis of a bicuspid or trileaflet valve with some reduction in systolic motion or • Rheumatic valve changes with commissural fusion	• **Mild AS:** Aortic V_{max} 2.0–2.9 m/s or ΔP_{mean} <20 mm Hg • **Moderate AS:** Aortic V_{max} 3.0–3.9 m/s or ΔP_{mean} 20–39 mm Hg	• Early LV diastolic dysfunction may be present • Normal left ventricular ejection fraction (LVEF)	None
C: Asymptomatic severe AS					
C1	Asymptomatic severe AS	Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or ΔP_{mean} ≥40 mm Hg • Aortic valve area (AVA) typically ≤1.0 cm^2 (or AVAi 0.6 cm^2/m^2) but not required to define severe AS • **Very severe AS:** Aortic V_{max} ≥5 m/s or ΔP_{mean} ≥60 mm Hg	• LV diastolic dysfunction • Mild LV hypertrophy • Normal LVEF	None: Exercise testing is reasonable to confirm symptom status
C2	Asymptomatic severe AS with LV dysfunction	Severe leaflet calcification/fibrosis or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or ΔP_{mean} ≥40 mm Hg • AVA typically ≤1.0 cm^2 (or AVAi 0.6 cm^2/m^2)	LVEF <50%	None
D: Symptomatic severe AS					
D1	Symptomatic severe high-gradient AS	Severe leaflet calcification/fibrosis or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or ΔP_{mean} ≥40 mm Hg • AVA typically ≤1.0 cm^2 (or AVAi ≤0.6 cm^2/m^2) but may be larger with mixed AS/AR	• LV diastolic dysfunction • LV hypertrophy • Pulmonary hypertension (PHTN) may be present	• Exertional dyspnea or decreased exercise tolerance • Exertional angina • Exertional syncope or presyncope
D2	Symptomatic severe low-flow/low-gradient AS with reduced LVEF	Severe leaflet calcification with severely reduced leaflet motion	• AVA ≤1.0 cm^2 with resting aortic V_{max} <4 m/s or ΔP_{mean} <40 mm Hg • Dobutamine stress echocardiography (DSE) shows AVA <1.0 cm^2 with V_{max} ≥4 m/s at any flow rate	• LV diastolic dysfunction • LV hypertrophy • LVEF <50%	• Heart failure (HF) • Angina • Syncope or presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	Severe leaflet calcification/fibrosis with severely reduced leaflet motion	• AVA ≤1.0 cm^2 (indexed AVA ≤0.6 cm^2/m^2) with an aortic V_{max} <4 m/s or ΔP_{mean} <40 mm Hg, AND • Stroke volume index <35 mL/m^2 • Measured when patient is normotensive (systolic blood pressure <140 mm Hg)	• Increased LV relative wall thickness • Small LV chamber with low stroke volume • Restrictive diastolic filling • LVEF ≥50%	• HF • Angina • Syncope or presyncope

3.2.1.1. Diagnostic Testing: Initial Diagnosis

COR	LOE	Recommendations
1	A	In patients with signs or symptoms of AS or a BAV, TTE is indicated for accurate diagnosis of the cause of AS, assessment of hemodynamic severity, measurement of LV size and systolic function, and determination of prognosis and timing of valve intervention.
1	B-NR	In patients with suspected low-flow, low-gradient severe AS with normal LVEF (Stage D3), optimization of blood pressure control is recommended before measurement of AS severity by TTE, TEE, cardiac catheterization, or CMR.
2a	B-NR	In patients with suspected low-flow, low-gradient severe AS with reduced LVEF (Stage D2), low-dose dobutamine stress testing with echocardiographic or invasive hemodynamic measurements is reasonable to further define severity and assess contractile reserve.
2a	B-NR	In patients with suspected low-flow, low-gradient severe AS with normal or reduced LVEF (Stages D2 and D3), calculation of the ratio of the outflow tract to aortic velocity is reasonable to further define severity.
2a	B-NR	In patients with suspected low-flow, low-gradient severe AS with normal or reduced LVEF (Stages D2 and D3), measurement of aortic valve calcium score by CT imaging is reasonable to further define severity.

3.2.1.5. Diagnostic Testing: Exercise Testing

COR	LOE	Recommendations
2a	B-NR	In asymptomatic patients with severe AS (Stage C1), exercise testing is reasonable to assess physiological changes with exercise and to confirm the absence of symptoms.
3: Harm	B-NR	In symptomatic patients with severe AS (Stage D1, aortic velocity ≥4.0 m/s or mean pressure gradient ≥40 mm Hg), exercise testing should not be performed because of the risk of severe hemodynamic compromise.

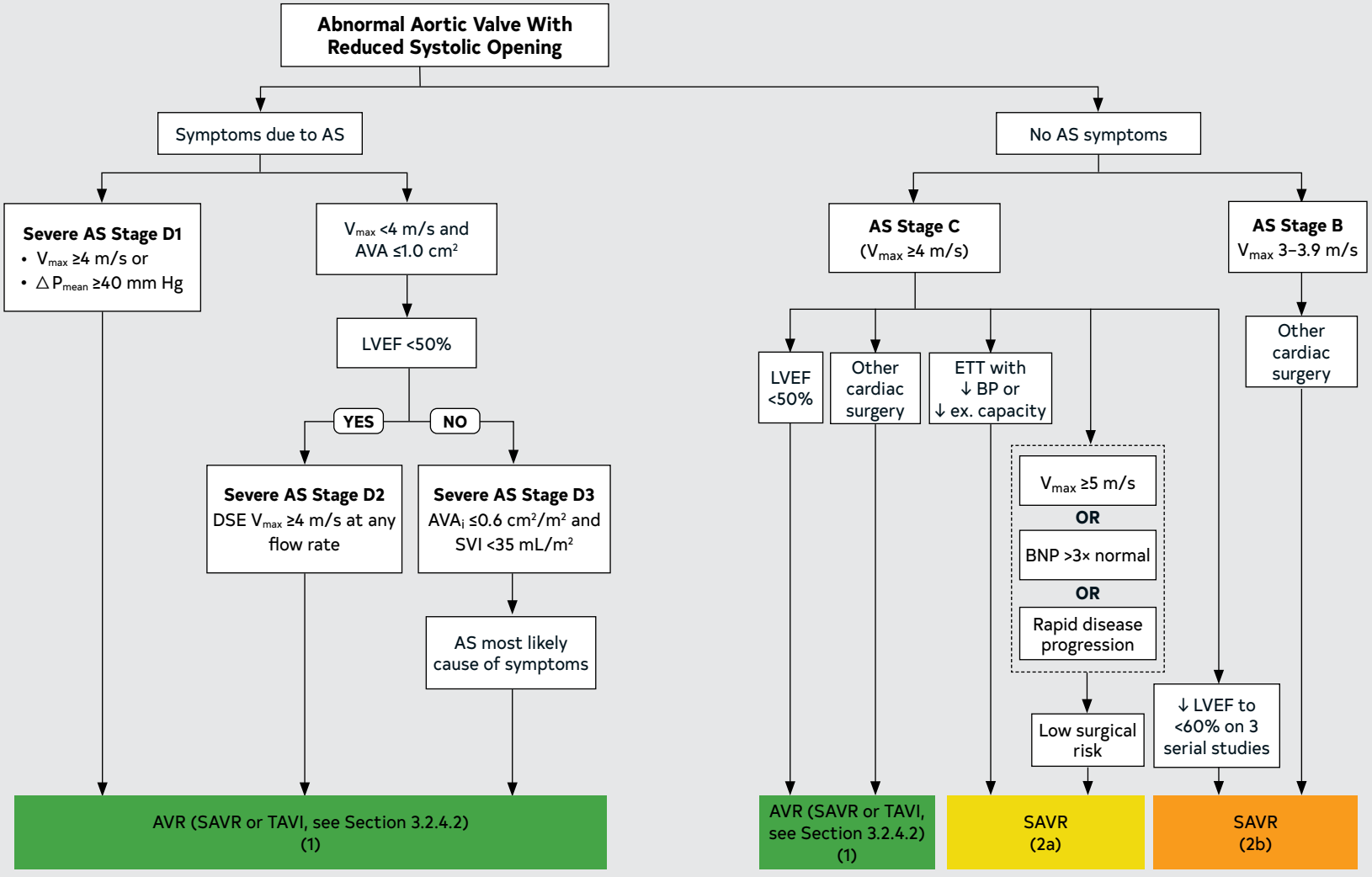
3.2.2. Medical Therapy

COR	LOE	Recommendations
1	B-NR	In patients at risk of developing AS (Stage A) and in patients with asymptomatic AS (Stages B and C), hypertension should be treated according to standard GDMT, started at a low dose, and gradually titrated upward as needed, with appropriate clinical monitoring.
1	A	In all patients with calcific AS, statin therapy is indicated for primary and secondary prevention of atherosclerosis on the basis of standard risk scores.
2b	B-NR	In patients who have undergone TAVI, renin–angiotensin system blocker therapy (ACE inhibitor or ARB) may be considered to reduce the long-term risk of all-cause mortality.
3: No Benefit	A	In patients with calcific AS (Stages B and C), statin therapy is not indicated for prevention of hemodynamic progression of AS.

3.2.3. Timing of Intervention

COR	LOE	Recommendations
1	A	In adults with severe high-gradient AS (Stage D1) and symptoms of exertional dyspnea, HF, angina, syncope, or presyncope by history or on exercise testing, AVR is indicated.
1	B-NR	In asymptomatic patients with severe AS and an LVEF <50% (Stage C2), AVR is indicated.
1	B-NR	In asymptomatic patients with severe AS (Stage C1) who are undergoing cardiac surgery for other indications, AVR is indicated.
1	B-NR	In symptomatic patients with low-flow, low-gradient severe AS with reduced LVEF (Stage D2), AVR is recommended.
1	B-NR	In symptomatic patients with low-flow, low-gradient severe AS with normal LVEF (Stage D3), AVR is recommended if AS is the most likely cause of symptoms.
2a	B-NR	In apparently asymptomatic patients with severe AS (Stage C1) and low surgical risk, AVR is reasonable when an exercise test demonstrates decreased exercise tolerance (normalized for age and sex) or a fall in systolic blood pressure of ≥10 mm Hg from baseline to peak exercise.
2a	B-R	In asymptomatic patients with very severe AS (defined as an aortic velocity of ≥5 m/s) and low surgical risk, AVR is reasonable.
2a	B-NR	In apparently asymptomatic patients with severe AS (Stage C1) and low surgical risk, AVR is reasonable when the serum B-type natriuretic peptide (BNP) level is >3 times normal.
2a	B-NR	In asymptomatic patients with high-gradient severe AS (Stage C1) and low surgical risk, AVR is reasonable when serial testing shows an increase in aortic velocity ≥0.3 m/s per year.
2b	B-NR	In asymptomatic patients with severe high-gradient AS (Stage C1) and a progressive decrease in LVEF on at least 3 serial imaging studies to <60%, AVR may be considered.
2b	C-EO	In patients with moderate AS (Stage B) who are undergoing cardiac surgery for other indications, AVR may be considered.

Figure 1. Timing of Intervention for AS



Colors correspond to the Class of Recommendation on page 18-19.

Arrows show the decision pathways that result in a recommendation for AVR. Periodic monitoring is indicated for all patients in whom AVR is not yet indicated, including those with asymptomatic (Stage C) and symptomatic (Stage D) AS and those with low-gradient AS (Stage D2 or D3) who do not meet the criteria for intervention.

See Section 3.2.4 for choice of valve type (mechanical versus bioprosthetic [TAVR or SAVR]) when AVR is indicated.

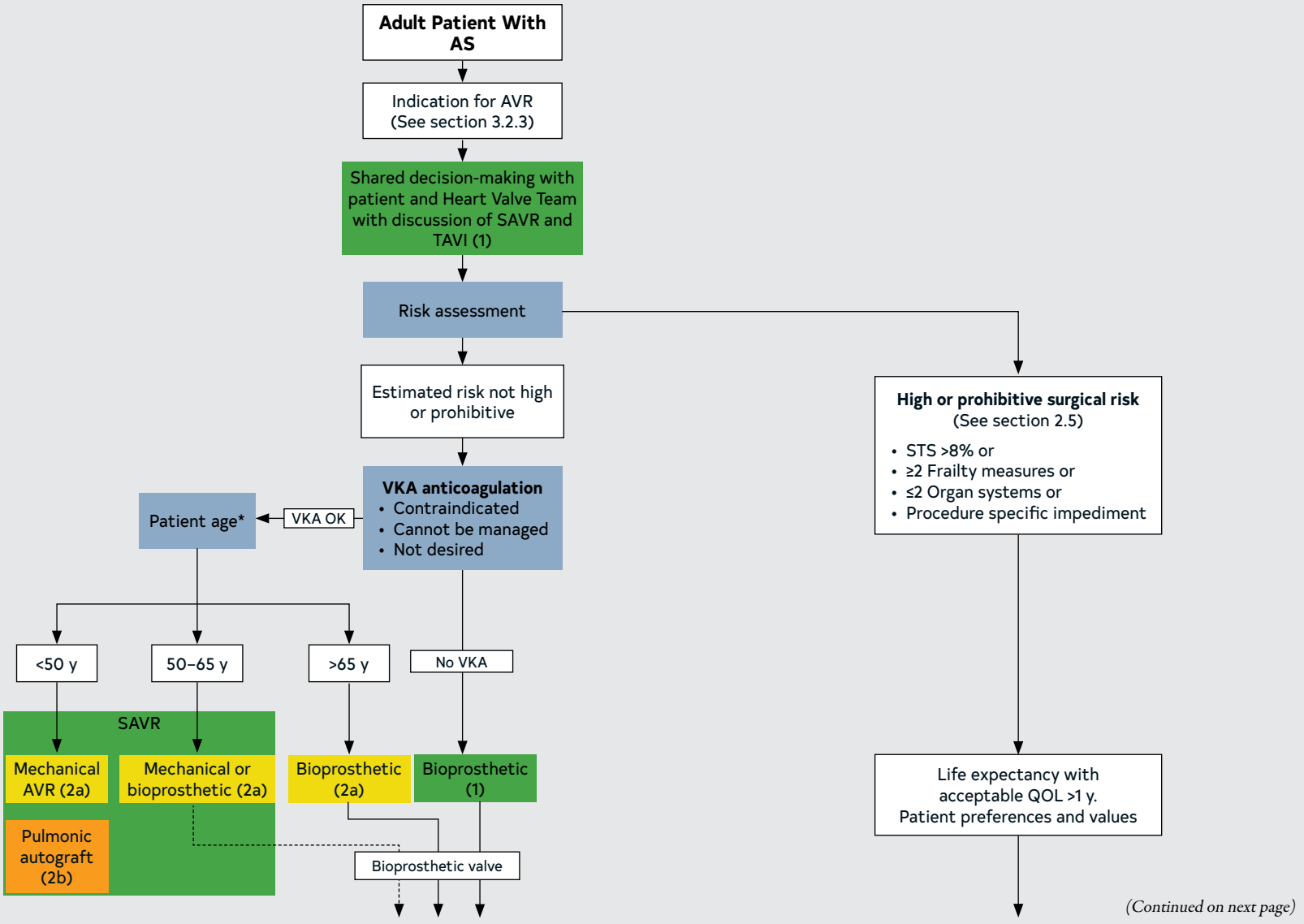
3.2.4.1. Choice of Mechanical Versus Bioprosthetic AVR

COR	LOE	Recommendations
1	C-EO	In patients with an indication for AVR, the choice of prosthetic valve should be based on a shared decision-making process that accounts for the patient's values and preferences and includes discussion of the indications for and risks of anticoagulant therapy and the potential need for and risks associated with valve reintervention.
1	C-EO	For patients of any age requiring AVR for whom VKA anticoagulant therapy is contraindicated, cannot be managed appropriately, or is not desired, a bioprosthetic AVR is recommended.
2a	B-R	For patients <50 years of age who do not have a contraindication to anticoagulation and require AVR, it is reasonable to choose a mechanical aortic prosthesis over a bioprosthetic valve.
2a	B-NR	For patients 50 to 65 years of age who require AVR and who do not have a contraindication to anticoagulation, it is reasonable to individualize the choice of either a mechanical or bioprosthetic AVR with consideration of individual patient factors and after informed shared decision-making.
2a	B-R	In patients >65 years of age who require AVR, it is reasonable to choose a bioprosthesis over a mechanical valve.
2b	B-NR	In patients <50 years of age who prefer a bioprosthetic AVR and have appropriate anatomy, replacement of the aortic valve by a pulmonic autograft (the Ross procedure) may be considered at a Comprehensive Valve Center.

3.2.4.2. Choice of SAVR Versus TAVI for Patients for Whom a Bioprosthetic AVR Is Appropriate

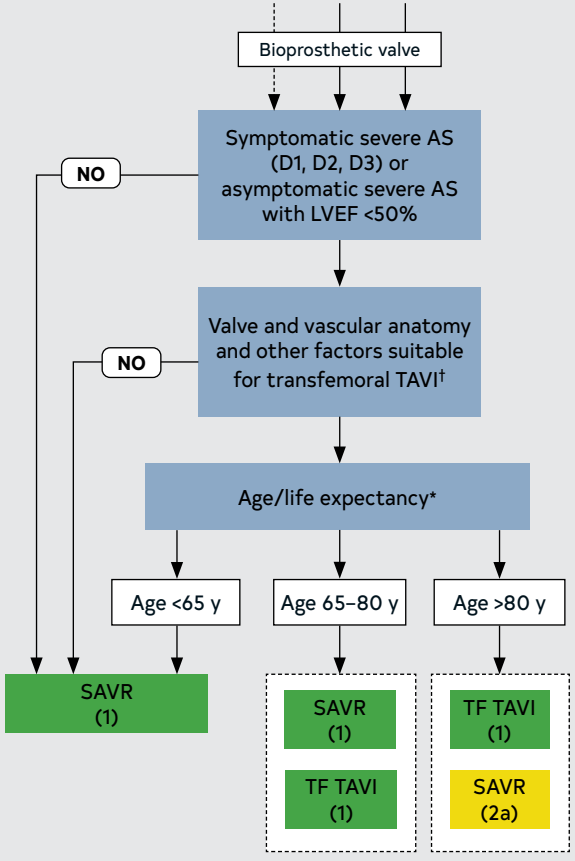
COR	LOE	Recommendations
1	A	For symptomatic and asymptomatic patients with severe AS and any indication for AVR who are <65 years of age or have a life expectancy >20 years, SAVR is recommended.
1	A	For symptomatic patients with severe AS who are 65 to 80 years of age and have no anatomic contraindication to transfemoral TAVI, either SAVR or transfemoral TAVI is recommended after shared decision-making about the balance between expected patient longevity and valve durability.
1	A	For symptomatic patients with severe AS who are >80 years of age or for younger patients with a life expectancy <10 years and no anatomic contraindication to transfemoral TAVI, transfemoral TAVI is recommended in preference to SAVR.
1	B-NR	In asymptomatic patients with severe AS and an LVEF <50% who are ≤80 years of age and have no anatomic contraindication to transfemoral TAVI, the decision between TAVI and SAVR should follow the same recommendations as for symptomatic patients in Recommendations 1, 2, and 3 above.
1	B-NR	For asymptomatic patients with severe AS and an abnormal exercise test, very severe AS, rapid progression, or an elevated BNP (COR 2a indications for AVR), SAVR is recommended in preference to TAVI.
1	A	For patients with an indication for AVR for whom a bioprosthetic valve is preferred but valve or vascular anatomy or other factors are not suitable for transfemoral TAVI, SAVR is recommended.
1	A	For symptomatic patients of any age with severe AS and a high or prohibitive surgical risk, TAVI is recommended if predicted post-TAVI survival is >12 months with an acceptable quality of life.
1	C-EO	For symptomatic patients with severe AS for whom predicted post-TAVI or post-SAVR survival is <12 months or for whom minimal improvement in quality of life is expected, palliative care is recommended after shared decision-making, including discussion of patient preferences and values.
2b	C-EO	In critically ill patients with severe AS, percutaneous aortic balloon dilation may be considered as a bridge to SAVR or TAVI.

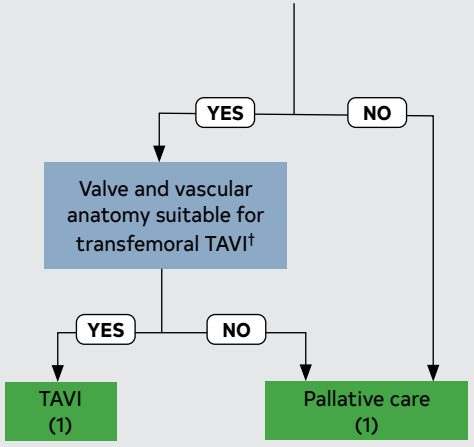
Figure 2. Choice of SAVR Versus TAVI When AVR is Indicated for Valvular AS



(Continued on next page)

Figure 2. Choice of SAVR Versus TAVI When AVR is Indicated for Valvular AS *(cont'd)*





Colors correspond to the Class of Recommendation on page 18-19.

* Approximate ages, based on US Actuarial Life Expectancy tables, are provided for guidance. The balance between expected patient longevity and valve durability varies continuously across the age range, with more durable valves preferred for patients with a longer life expectancy. Bioprosthetic valve durability is finite (with shorter durability for younger patients) whereas mechanical valves are very durable but require life-long anticoagulation. Long-term (20 year) data on outcomes with surgical bioprosthetic valves is available; robust data on transcatheter bioprosthetic valves only extends to 5 years leading to uncertainty about longer term outcomes. The decision about valve type should be individualized based on patient specific factors that might affect expected longevity.

† Placement of a transcatheter valve requires vascular anatomy that allows transfemoral delivery and the absence of aortic root dilation that would require surgical replacement. Valvular anatomy must be suitable for placement of the specific prosthetic valve including annulus size and shape, leaflet number and calcification and coronary ostial height. See ACC Expert Consensus Statement.

Table 5. A Simplified Framework With Examples of Factors Favoring SAVR, TAVI, or Palliation Instead of Aortic Valve Intervention

	Favors SAVR	Favors TAVI	Favors Palliation
Age/life expectancy*	• Younger age/longer life expectancy	• Older age/fewer expected remaining years of life	• Limited life expectancy
Valve anatomy	• BAV • Subaortic (LV outflow tract) calcification • Rheumatic valve disease • Small or large aortic annulus†	• Calcific AS of a trileaflet valve	
Prosthetic valve preference	• Mechanical or surgical bioprosthetic valve preferred • Concern for patient–prosthesis mismatch (annular enlargement might be considered)	• Bioprosthetic valve preferred • Favorable ratio of life expectancy to valve durability • TAVI provides larger valve area than same size SAVR	
Concurrent cardiac conditions	• Aortic dilation‡ • Severe primary MR • Severe CAD requiring bypass grafting • Septal hypertrophy requiring myectomy • AF	• Severe calcification of the ascending aorta ("porcelain" aorta)	• Irreversible severe LV systolic dysfunction • Severe MR attributable to annular calcification
Noncardiac conditions		• Severe lung, liver, or renal disease • Mobility issues (high procedural risk with sternotomy)	• Symptoms likely attributable to noncardiac conditions • Severe dementia • Moderate to severe involvement of ≥2 other organ systems
Frailty	• Not frail or few frailty measures	• Frailty likely to improve after TAVI	• Severe frailty unlikely to improve after TAVI

Table 5. A Simplified Framework With Examples of Factors Favoring SAVR, TAVI, or Palliation Instead of Aortic Valve Intervention *(cont'd)*

	Favors SAVR	Favors TAVI	Favors Palliation
Estimated procedural or surgical risk of SAVR or TAVI	• SAVR risk low • TAVI risk high	• TAVI risk low to medium • SAVR risk high to prohibitive	• Prohibitive SAVR risk (>15%) or post-TAVI life expectancy <1 y
Procedure-specific impediments	• Valve anatomy, annular size, or low coronary ostial height precludes TAVI • Vascular access does not allow transfemoral TAVI	• Previous cardiac surgery with at-risk coronary grafts • Previous chest irradiation	• Valve anatomy, annular size, or coronary ostial height precludes TAVI • Vascular access does not allow transfemoral TAVI
Goals of Care and patient preferences and values	• Less uncertainty about valve durability • Avoid repeat intervention • Lower risk of permanent pacer • Life prolongation • Symptom relief • Improved long-term exercise capacity and QOL • Avoid vascular complications • Accepts longer hospital stay, pain in recovery period	• Accepts uncertainty about valve durability and possible repeat intervention • Higher risk of permanent pacer • Life prolongation • Symptom relief • Improved exercise capacity and QOL • Prefers shorter hospital stay, less postprocedural pain	• Life prolongation not an important goal • Avoid futile or unnecessary diagnostic or therapeutic procedures • Avoid procedural stroke risk • Avoid possibility of cardiac pacer

* Expected remaining years of life can be estimated from U.S. Actuarial Life Expectancy tables. The balance between expected patient longevity and valve durability varies continuously across the age range, with more durable valves preferred for patients with a longer life expectancy. Bioprosthetic valve durability is finite (with shorter durability for younger patients), whereas mechanical valves are very durable but require lifelong anticoagulation. Long-term (20-y) data on outcomes with surgical bioprosthetic valves are available; robust data on transcatheter bioprosthetic valves extend only to 5 y, leading to uncertainty about longer-term outcomes. The decision about valve type should be individualized on the basis of patient-specific factors that might affect expected longevity.

† A large aortic annulus may not be suitable for currently available transcatheter valve sizes. With a small aortic annulus or aorta, a surgical annulus-enlarging procedure may be needed to allow placement of a larger prosthesis and avoid patient–prosthesis mismatch.

‡ Dilation of the aortic sinuses or ascending aorta may require concurrent surgical replacement, particularly in younger patients with a BAV.

AMERICAN COLLEGE of CARDIOLOGY

CLASS (STRENGTH) OF RECOMMENDATION

CLASS I (STRONG) — **Benefit >>> Risk**

Suggested phrases for writing recommendations:

- Is recommended
- Is indicated/useful/effective/beneficial
- Should be performed/administered/other
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is recommended/indicated in preference to treatment B
  - Treatment A should be chosen over treatment B

CLASS 2a (MODERATE) — **Benefit >> Risk**

Suggested phrases for writing recommendations:

- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

CLASS 2b (WEAK) — **Benefit ≥ Risk**

Suggested phrases for writing recommendations:

- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well-established

CLASS 3: No Benefit (MODERATE) — **Benefit = Risk**

(Generally, LOE A or B use only)

Suggested phrases for writing recommendations:

- Is not recommended
- Is not indicated/useful/effective/beneficial
- Should not be performed/administered/other

CLASS 3: Harm (STRONG) — **Risk > Benefit**

Suggested phrases for writing recommendations:

- Potentially harmful
- Causes harm
- Associated with excess morbidity/mortality
- Should not be performed/administered/other

LEVEL (QUALITY) OF EVIDENCE‡

LEVEL A

- High-quality evidence‡ from more than 1 RCT
- Meta-analyses of high-quality RCTs
- One or more RCTs corroborated by high-quality registry studies

LEVEL B-R — **(Randomized)**

- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

LEVEL B-NR — **(Nonrandomized)**

- Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies
- Meta-analyses of such studies

LEVEL C-LD — **(Limited Data)**

- Randomized or nonrandomized observational or registry studies with limitations of design or execution
- Meta-analyses of such studies
- Physiological or mechanistic studies in human subjects

LEVEL C-EO — **(Expert Opinion)**

Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; RCT, randomized controlled trial.

Abbreviations

ACE, angiotensin-converting enzyme; **AF**, atrial fibrillation; **ARB**, angiotensin receptor blocker; **AR**, aortic regurgitation; **AS**, aortic stenosis; **AVR**, aortic valve replacement; **BAV**, bicuspid aortic valve; **BNP**, B-type natriuretic peptide; **CAD**, coronary artery disease; **CMR**, cardiac magnetic resonance; **COR**, Class of Recommendation; **CT**, computed tomography; **GDMT**, guideline-directed management and therapy; **HF**, heart failure; **INR**, international normalized ratio; **LOE**, Level of Evidence; **LV**, left ventricle (left ventricular); **LVEF**, left ventricular ejection fraction; **MDT**, multidisciplinary team; **MR**, mitral regurgitation; **MS**, mitral stenosis; **RCT**, randomized controlled trial; **RV**, right ventricle (right ventricular); **SAVR**, surgical aortic valve replacement; **TAVI**, transcatheter aortic valve implantation; **TEE**, transesophageal echocardiography (echocardiogram); **TTE**, transthoracic echocardiography (echocardiogram); **VHD**, valvular heart disease; **VKA**, vitamin K antagonist



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This pocket guide attempts to define principles of practice that should produce high-quality patient care. It is applicable to specialists, primary care, and providers at all levels. This pocket guide should not be considered exclusive of other methods of care reasonably directed at obtaining the same results. The ultimate judgment concerning the propriety of any course of conduct must be made by the clinician after consideration of each individual patient situation. Neither IGC, the medical associations, nor the authors endorse any product or service associated with the distributor of this clinical reference tool.

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